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Quantitative Characterization of Surface Self-Assembly Imaging Using Shapelets[1] NASSER MOHIEDDIN ABUKHDEIR, ROBERT SUDERMAN, University of Waterloo, DANIEL J. LIZOTTE, University of Western Ontario — Microscopy and imaging of surface self-assembly phenomena have advanced significantly over the past decade. In order to determine structure/property relationships robust automated analysis of the resulting images is required, but has not advanced at an equally rapid pace. Recently, quantitative characterization techniques have been developed and applied, such as using bond-orientational order (BOO) theory. BOO-based methods have significant limitations in that they do not provide pixel-level resolution and are not robust in the presence of measurement noise. In this work, a fundamentally different method for automated quantitative characterization of surface self-assembly imaging is presented which uses a family of localized functions called "shapelets". The method is presented and applied to quantitative characterization of stripe and hexagonal patterns which are frequently observed in surface self-assembly. The shapelet-based method is shown to be general, highly accurate, and robust in the presence of measurement noise. It is able to efficiently determine local pattern characteristics such as pattern strength and orientation for the determination of structure/property relationships.

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